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ABSTRACT

The United States Training and Employment Service General Aptitude Test Battery (GATB), first published in 1947, has been included in a continuing program of research to validate the tests against success in many different occupations. The GATB consists of 12 tests which measure nine aptitudes: General Learning Ability; Verbal Aptitude; Numerical Aptitude; Spatial Aptitude; Form Perception; Clerical Perception; Motor Coordination; Finger Dexterity; and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, and a standard deviation of 20. Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, when combined, predict job performance. Cutting scores are set only for those aptitudes which aid in predicting the performance of the job duties of the experimental sample. The GATB norms described are appropriate only for jobs with content similar to that shown in the job description presented in this report. A description of the validation sample is also included. (AG)

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# TECHNICAL REPORT

# ON

# STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY

# FOR

# CANDY PACKER (confection) 8-05.21

# B-464 or S-193

U. S. Employment Service in
Cooperation with
Pennsylvania State Employment Service

September 1962

TM 001 706

GATB #2329
April 1960

# STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY

FOR

CANDY PACKER (confection) 8-05.21

B-464 or S-193

## Summary

The General Aptitude Test Battery, B-1002A, was administered to a sample of 75 women employed as Candy Packer 8-05.21 by the Stephen F. Whitman and Son, Inc., in Philadelphia, Pennsylvania. The criterion consisted of supervisory ratings consisting of rank order ratings which were converted to linear scores. On the basis of mean scores, standard deviations, correlations with the criterion, job analysis data, and their combined selective efficiency, Aptitudes K-Motor Co-ordination, F-Finger Dexterity and M-Manual Dexterity were selected for inclusion in the test norms.

## GATB Norms for Candy Packer B-464 or S-193

Table I shows, for B-1001 and B-1002, the minimum acceptable score for each aptitude included in the test norms for Candy Packer 8-05.21

TABLE I

Minimum Acceptable Scores on B-1001 and B-1002 for B-464 or S-193

| B-1001 | | | B-1002 | | |
|---|---|---|---|---|---|
| Aptitude | Tests | Minimum Acceptable Aptitude Score | Aptitude | Tests | Minimum Acceptable Aptitude Score |
| T | CB-1-G<br>CB-1-K | 75 | K | Part 8 | 80 |
| F | CB-1-F<br>CB-1-H | 85 | F | Part 3 | 80 |
| M | CB-1-M<br>CB-1-N | 90 | M | Part 9<br>Part 10 | 85 |

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Effectiveness of Norms

The data in Table V indicate that 17 of the 25 poor workers, or 68 percent of them, did not achieve the minimum scores established as cutting scores on the recommended test norms. This shows that 68 percent of the poor workers would not have been hired if the recommended test norms had been used in the selection process. Moreover, 36 of the 44 workers who made qualifying test scores, or 82 percent, were good workers.

## I. Problem

This study was conducted to determine the best comgination of aptitudes and minimum scores to be used as norms on the General Aptitude Test Battery for the occupation of Candy Packer, 8-05.21.

## II. Sample

During the periods of March 29-31 and April 1-20, 1960, the General Aptitude Test Battery, B-1002A, was administered to 75 women employed as Candy Packer 8-05.21, at Stephen F. Whitman and Son, Inc., Philadelphia, Pennsylvania. The company has at least 165 women engaged in this occupation, and 75 volunteered to participate in this study. The company does not require that workers have previous experience because the inexperienced employee receives 5 days of on the job training before being assigned to a belt line position on the conveyor line (alongside an experienced worker); the belt line supervisor observes and checks her work closely. A 60 day trial period is given the new worker. All of the workers in this sample are considered experienced workers. There is no minimum age or educational requirement.

Table II shows the means, standard deviation, ranges, and Pearson product-moment correlations with the criterion for age, education and experience.

TABLE II

Means (M), Standard Deviations ($\sigma$), Ranges, and Pearson Product-Moment Correlations with the Criterion (r) for Age, Education and Experience

CANDY PACKER, 8-05.21

N = 75

| | M | $\sigma$ | Range | $r_{xy}$ |
|---|---|---|---|---|
| Age (years) | 38.987 | 6.391 | 28-50 | -.044 |
| Education (years) | 9.827 | 1.814 | 6-14 | .142 |
| Experience (months) | 108.600 | 44.175 | 63-312 | .096 |

**Significant at the .01 level
*Significant at the .05 level

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There are no significant correlations between age, education and experience and the criterion. The data in Table II indicate that the sample is suitable for test development purposes with respect to these variables.

III. Job Description

Job Title: CANDY PACKER, 8-05.21

Job Summary: Cups and packs chocolates and confections into finished boxes that move on straight line conveyor, inserting candy according to definite arrangement of pieces. Visually inspects each piece selected from stock case before placing it in cup and places rejects on conveyor belt.

Work Performed: Secures from stock girl stock case containing approximately 11 pounds of same candy pieces; secures from supply girl adequate supply of colored paper cups. Sits or stands at waist high bench in front of conveyor belt that carries the boxes.

Packs candy into boxes: Picks up nest of cups in left hand and, with thumb in the center of cup, slides cup loose from nest, using right hand, reaches into stock case and picks up piece of candy; inserts selected piece into cup and places cupped candy into designated position in box, following definite arrangement of pieces. Visually inspects each piece selected from stock case before placing it in cup. Discards rejects such as irregularly shaped, dented, scratched or poorly coated pieces, placing rejects on conveyor belt.

Variations: Some packers along conveyor line pick up two pieces of candy, position pieces into cup using fingers of both hands and place pieces in position in alternate boxes on conveyor. Some may pick up pre-wrapped candy, place pieces in cups and position them in box. Others may place pre-cut cards in sectional dividers to form new layer.

IV. Experimental Battery

All the tests of the GATB, B-1002A, were administered to the sample group.

V. Criterion

The criterion data collected for the study consisted of two sets of data. Rank-order ratings (converted to linear scores) and descriptive rating scale scores. These data correlated .681 with each other. A final criterion which is more reliable than either one separately was obtained by (1) converting the descriptive rating scale score to rank order ratings and these ratings to linear scores; and (2) averaging the two linear scores for each individual in the experimental sample.

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## VI. Qualitative and Quantitative Analyses

### A. Qualitative Analysis:

The job analysis indicated that the following aptitudes measured by the GATB appear to be important for this occupation.

Form Perception (P) - Aptitude present in observing each piece selected from stock case to determine if candy is irregular in shape, dented, scratched, poorly coated, twin pieces, etc.; discarding rejects. Also present in the turning of oblong pieces to conform to exact location in box.

Motor Coordination (K) - This aptitude present in all tasks in observing each piece selected from stock case, in placing candy into cup and in making precise movements with speed in placing cupped card accurately into designated position in box.

Finger Dexterity (F) - Uses fingers in picking up nest of cups, in sliding individual cup from nest, in picking up selected piece from stock case, in placing candy into cup and in holding cupped piece firmly in fingers while moving it into position in box.

Manual Dexterity (M) - This aptitude present in moving the cupped candy from the stock case to the box on the conveyor, a distance from 6 to 12 inches, depending on the position assumed by the packer. This task is performed approximately 12,800 times in an 8 hour work day.

On the basis of the job analysis data, the following aptitudes are considered obviously unimportant for performing the duties of this job and are considered "irrelevant" aptitudes: V, N and Q.

### B. Quantitative Analysis:

Table III shows the means, standard deviations, and Pearson product-moment correlations with the criterion for the aptitudes of the GATB. The means and standard deviations of the aptitudes are comparable to general population norms with a mean of 100 and a standard deviation of 20.

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TABLE III

Means (M), Standard Deviations ($\sigma$), and Pearson Product-Moment Correlations with the Criterion (r) for the Aptitudes of the GATB

N = 75

| Aptitudes | M | $\sigma$ | r |
|---|---|---|---|
| G-Intelligence | 79.7 | 13.6 | .263* |
| V-Verbal Aptitude | 85.5 | 12.3 | .346** |
| N-Numerical Aptitude | 78.2 | 15.2 | .004 |
| S-Spatial Aptitude | 79.3 | 14.8 | .282* |
| P-Form Perception | 81.7 | 15.3 | .191 |
| Q-Clerical Perception | 90.4 | 12.8 | .164 |
| K-Motor Coordination | 99.8 | 16.7 | .170 |
| F-Finger Dexterity | 97.1 | 16.6 | .309** |
| M-Manual Dexterity | 97.2 | 16.6 | .261* |

**Significant at the .01 level
*Significant at the .05 level

Aptitudes K, F, and M have the highest mean scores and aptitudes G, V, S, and Q have relatively low standard deviations.

For a sample of 75 cases, correlations of .296 and .228 are significant at the .01 level and the .05 level of confidence, respectively. Aptitudes V and F correlate significantly with the criterion at the .01 level. Aptitudes G, S and M correlate significantly with the criterion at the .05 level.

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C. Selection of Test Norms

TABLE IV

Summary of Qualitative and Quantitative Data

| Type of Evidence | Aptitudes | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | G | V | N | S | P | Q | K | F | M |
| Job Analysis Data | | | | | | | | | |
| Important | | | | | X | | X | X | X |
| Irrelevant | | O | O | | | O | | | |
| Relatively High Mean | | | | | | | X | X | X |
| Relatively Low Sigma | X | X | | X | | X | | | |
| Significant Correlation with Criterion | X | X | | X | | | | X | X |
| Aptitudes to be considered for trial norms | G | | | S | | | K | F | M |

Trial norms consisting of various combinations of Aptitudes G, S, K, F, and M with appropriate cutting scores were evaluated against the criterion by means of the tetachoric correlation technique. A comparison of the results showed that B-1002 norms consisting of K-80, F-80 and M-85 had the best selective efficiency.

VII. Validity of Norms

The validity of the norms was determined by computing a tetrachoric correlation coefficient between the test norms and the criterion and applying the Chi Square test. The criterion was dichotomized by placing as close as possible to one-third of the sample in the low criterion group. A criterion critical score of 42 was used and resulted in 25 of the workers or 33 percent of the sample being placed in the low criterion group.

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Table V shows the relationship between test norms consisting of Aptitudes K, F and M with critical scores of 80, 80, and 85 respectively, and the dichotomized criterion for Candy Packer 8-05.21. Workers in the high criterion group have been designated as "good workers" and those in the low criterion group as "poor workers."

TABLE V

Validity of Test Norms for Candy Packer 8-05.21
(K-80, F-80, M-85)

N = 75

| | Non-Qualifying Test Scores | Qualifying Test Scores | Total |
|---|---|---|---|
| Good Workers | 14 | 36 | 50 |
| Poor Workers | 17 | 8 | 25 |
| Total | 31 | 44 | 75 |

$r_{tet} = .59$ $\quad X^2 = 9.409$

$\sigma_{r_{tet}} = .19$ $\quad P/2 < .005$

The data in the above table indicate a significant relationship between the test norms and the criterion for the sample.

## VIII. Conclusions

On the basis of the results of this study, Aptitudes K, F, and M with minimum scores of 80, 80 and 85 respectively, have been established as B-1002 norms for the occupation of Candy Packer, 8-05.21. The equivalent B-1001 norms consist of T-75, F-85 and M-90.

## IX. Determination of Occupational Aptitude Pattern

A significant relationship between OAP-35 and the criterion for the experimental sample was obtained. The proportion of the sample screened out by OAP-35 was .39, which is within the required range of .10 to .60. Therefore, the occupation Candy Packer, 8-05.21 will be allocated to OAP-35 of the existing 35 OAP's (Revised 10/61).